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New *Lecanora*, *Lecidea, Melaspilea*, *Placynthium,* and *Verrucaria* records for Turkey and Asia

Ali Aslan[1] & Kenan Yazici *[2]

[1]*Biology Department, Kazım Karabekir Education Faculty, Atatürk University, Erzurum, Turkey*

[2]*Biology Department, Faculty of Science, Karadeniz Technical University, 61080, Trabzon, Turkey*

* Correspondence to: *kcagri_1997@yahoo.com*

Abstract — Five species of lichenized fungi – (*Lecanora invadens*, *Lecidea promiscua, Melaspilea interjecta*, *Placynthium garovaglioi,* and *Verrucaria bryoctona*) – are reported as new to Turkey. Three of them, *M. interjecta, P. garovaglioi,* and *V. bryoctona,* are also new to Asia. Descriptions are presented, including geographic distribution, substrate, chemistry, and comparisons with morphologically similar taxa.

Key words — *Ascomycota*, biodiversity, Iğdır, Van, Burdur

Introduction

The lichen flora of Turkey is still incompletely known, as it is in many parts of the world. Although many recent studies contributed to the lichen flora of Turkey (Halıcı & Cansaran-Duman 2008, Karagöz et al. 2011, Kınalıoğlu 2010, Halıcı et al. 2010a,b, Osyczka et al. 2011, Candan & Halıcı 2011, Oran & Öztürk 2012, Senkardeşler 2010, Yazıcı & Aslan 2009, Yazıcı et al. 2008, 2010a,b, 2011a,b), there are more unexplored regions than explored ones in the country. Therefore, more studies are needed to complete the lichen flora of Turkey.

Here we report five new records for Turkey, of which three are new for Asia, based on our fieldwork in the regions of Van, Iğdır and Burdur in eastern Turkey.

The Van region has a climate characterized by cold and snowy winters and hot dry summers, with a temperature range of –26.9–36.0 °C, a mean annual rainfall of around 370–570 mm, and mean annual humidity of 51–66% (Akman 1999). The examined area is dominated by steppe vegetation and lacks trees completely. Three localities were surveyed: Kapı village in Saray district near the Iranian border is an open windswept area with gently sloping rocky terrain;

the Çatak district is a partly well lit high elevation sloped terrain with a waterfall and humid rocks; and Bahçesaray, at the border of the Van district, follows the road through a well-lit windswept weakly sloping land with a stream and humid rocks (Baytop & Denizci 1963).

The climate of the Iğdır region is similar to Van, with a mean annual temperature of 11.6 °C, mean annual rainfall of 257.6 mm, and average humidity of 63%, Precipitation is generally moderate in the summers and heavy during winter (Akman 1999). The Iğdır region is dominated by steppe with few forested areas, although *Elaeagnus, Populus*, *Prunus*, *Pyrus,* and *Salix* trees are seen occasionally in the visited locality, Kula village (Tuzluca) (Baytop & Denizci 1963). Kula is a well-lit, high elevation, windswept, treeless area with gently sloping terrain containing streams, grass, and many calcareous and siliceous rocks.

Burdur has a continental Mediterranean climate with cold, snowy winters and very hot, long, dry summers with a mean annual temperature of 15°C and the temperature range of –16–39 °C, mean annual rainfall of about 468 mm, and average humidity of 51.2% (Akman 1999). The visited area, Bucak district, is mountainous with much forest dominated by *Abies*, *Cedrus*, *Ficus*, *Fraxinus*, *Juniperus*, *Olea*, *Pinus*, *Prunus*, *Quercus*, *Rhus*, and *Pistacia* alternating with streams and lakes (Baytop & Denizci 1963).

Materials & methods

Lichens were collected from five localities in the districts Iğdır, Burdur and Van in Turkey in July 2009. Air-dried samples were examined with a Nikon SMZ1500 stereomicroscope and a Nikon Eclipse 80i compound light microscope. For the identifications relevant keys consulted (Czeika & Czeika 2007, Hertel 2006, Magnusson 1952, Orange 1991, Sliwa 2007, Smith et al. 2009). Vouchers are stored in the Herbarium of the Biology Department, Karadeniz Technical University, Trabzon, Turkey (KTUB) and in the Herbarium of the Biology Department, Kazım Karabekir Education Faculty, Atatürk University, Erzurum, Turkey (ATAKKEF). The descriptions are based on Turkish specimens and supplemented by data from the indicated literature.

Species recorded

Lecanora invadens H. Magn., Lichens Central Asia: 87. 1940.

Thallus crustose, ± superficial or evanescent, indistinct, to 0.6 cm in diam., more evident around apothecia, ± grey to greenish grey, often with distinct bluish pigment. Apothecia mostly clustered in groups, sessile, or constricted at the base and raised, ± flat when mature, to 0.6 mm in diam.; disc plane to slightly convex, ± smooth, dark brown to slightly black and slightly pruinose, rarely epruinose; margin level ± with the disc ± rough, entire, pruinose, paler than the thallus, white. Amphithecium 155–175 µm thick, corticate, with algae mostly dense below the cortex; cortex mostly delimited, slightly thicker at the

base, 16–55 μm thick, composed of adglutinated hyphae, thin and bluish-green at the very top of the margin; epithecium yellowish-brown, granular; granules usually sparse, between the paraphysis tips; hymenium hyaline, 50–65 μm high; hypothecium hyaline or yellow, 60–100 μm high. Paraphyses simple or branched at the tips, slender or ± thickened, ± pigmented at the tips. Asci clavate, 8-spored; ascospores hyaline, simple, ± broadly ellipsoid, 9–12 × 6–8 μm. Pycnidia absent. Apothecial margin K± yellow, C–, KC± yellow, P–; disc K± yellow, C–, KC± yellow, P–.

Lecanora invadens grows on non-calcareous or weakly calcareous rock and is mostly 'parasitic' on other lichens (e.g., *Aspicilia*, *Collema*, *Endocarpon*, *Lecanora, Verrucaria*). It is rarely found on man-made substrata. New to Turkey and the Middle East, where it was accompanied by *Aspicilia calcarea*, *Collema tenax*, *Endocarpon* sp., and *Fulgensia fulgens.* Also known from Europe, Asia, and North America (Sliwa 2007).

Specimen examined: **TURKEY**. **Burdur:** Bucak, surroundings of Karacaören Dam, 37°21′35.14″N 30°50′05.80″E, 300 m, on *Endocarpon* sp., *Collema tenax*, and soil, 25.06.2012, leg. K. Yazici. (KTUB–2336).

Remarks— *Lecanora invadens* resembles *L. semipallida* but has dark brown to slightly black and slightly pruinose apothecia with a yellow-brown epithecium, and a more distinct thallus.

Lecidea promiscua Nyl., Flora 57: 357. 1874.

Thallus thin, indistinctly areolate-rimose and sordid-white; prothallus not developed or indistinct; areoles flat, irregular and indistinct; medulla white, I+ intensely violet. Apothecia sessile, with markedly or strongly constricted base, to 2.5(–4) mm in diam.; disc black, flat to ± convex, emarginate, epruinose or slightly pruinose; margin black, persistent, dull or ± shiny; exciple black, blue-green to brown-black in a thin, peripheral rim, 60–150 μm wide; epithecium dark blue-green to green-brown-black, 12–18 μm thick; hymenium hyaline or faintly green, 46–58 μm tall; paraphyses simple, occasionally branched, lax or contiguous, especially towards the apical ends; hypothecium dark-brown below, lens-shaped, hyaline above; asci clavate 8-spored, 40–50 × 13–17μm; ascospores hyaline, simple, oblong to oblong-ellipsoid, (7–)9–12.5 × (2.5–)3–4.5 μm. Pycnidia semi-immersed, 90–150 μm in diam.; conidia bacilliform to filiform, straight, (9–)9.5–14 × 1–1.3 μm. C–, K–, KC–, Pd–, UV–.

Lecidea promiscua is a circumpolar, arctic-alpine to boreal-montane lichen, growing on granite boulders close to the ground and on siliceous pebbles in wind-exposed and sunny situations widespread in the Alps. New to Turkey and the Middle East, where it accompanied *Aspicilia desertorum, A. cinerea, Acarospora fuscata, Caloplaca saxicola, Immersaria athroocarpa,* and *Lecanora muralis.* Also known from Europe and Central Asia (Hertel 2006).

Specimen examined: **TURKEY**. **Van:** Saray-Kapıköy, vicinity of Iran border, 38°29′57″N 44°17′33″E, 2276 m, on siliceous rock, 28.09.2009, leg. A. Aslan. (ATAKKEF–1450).

Remarks— *Lecidea promiscua* resembles *L. promiscens,* which is distinguished by a thick white thallus.

Melaspilea interjecta (Leight.) A.L.Sm., Monogr. Brit. Lich. 2: 228. 1911.

Thallus thin, pale white-green-grey to pale fawn or brown; photobiont cells 5–16 µm in diam., trebouxioid. Apothecia 0.4–1.2 × 0.2–0.3 mm, lirellate, simple or forked, at with a black, slit-like, later widening disc and a tumid margin, later developing additional slits or becoming subgyrose-contorted; true exciple well developed, reddish brown-black, K± olivaceous; epithecium pale to dark brown, K± olivaceous; hymenium 70–85 µm tall, colourless, I+ yellowish, K/I+ blue; hypothecium concolorous with exciple; paraphyses 1.5–2 µm wide, richly branched and anastomosing. Asci 47–53 × 21–26 µm, 8-spored; apical dome with narrow ocular chamber. Ascospores 17–23 × 7–9 µm, 1-septate, sickle-shaped, constricted and easily broken at the septum, colourless but old spores brown and finely warted.

Melaspilea interjecta grows on vertical, smooth surfaces of slate rocks and mica-schist rocks. New to Turkey and Asia. Also known from Europe (Smith et al. 2009).

Specimen examined: **TURKEY**. **Van:** Çatak, vicinity of waterfall, 38°03′10″N 43°02′59″E, 1689 m, on *Aspicilia calcarea* on calcareous rock, 16.09.2009, leg. A. Aslan. (ATAKKEF–1451).

Remarks— *Melaspilea interjecta* has usually the appearance of an *Opegrapha,* while aged specimens with subgyrose apothecia are likely to be confused with *Polysporina simplex.* The bilocular ascospores are distinctive.

Placynthium garovaglioi (A. Massal.) Malme, Lichenes Suecici Exs.: 734. 1918.

Thallus thick, brown in the centre, with green-brown lobe tips, small, 0.7 – 1.5 cm wide, with at least part of the margin obscurely lobed; thallus lobes very slender; lobes 0.1–0.12 mm wide, 0.4–1 mm long; marginal lobes, when present, are very slender; thallus centre is uneven; thallus with dense, flat to convex, nodular-scurfy squamules 0.08–0.25 mm in diam.; the entire thallus powdery with dense, bluish-white pruina, ± dull grey-brown or ± green-brown when wet; blue-black prothallus occasionally visible at tips and margins of the lobes. Apothecia not seen.

Placynthium garovaglioi grows in patches along fissures on sheltered, vertical to overhanging, dry, and on steeply inclined, sunny calcareous rocks with some water seepage. New to Turkey and Asia, where it accompanied *Aspicilia, Calcarea, Caloplaca lactea*, *Caloplaca variabilis, Candelariella aurella,*

Dermatocarpon miniatum, and *Verrucaria calciseda.* Also known from Europe (Czeika & Czeika 2007).

Specimens examined: **TURKEY**. **Van:** Bahçesaray, exit of district, 38°06′08″N 42°48′41″E, 1587 m, on calcareous rock, 14.09.2009, leg. A. Aslan, (ATAKKEF–1452). **Iğdır:** Tuzluca, Kula village, roadside, 40°51′4.25″N 43°25′53.48″E, 1175 m, on calcareous rock, 12.07.2010, leg. K. Yazici. (KTUB–2337).

Remarks— *Placynthium garovaglioi* is similar to *P. hungaricum,* but has appressed marginal lobes and central parts with tightly packed squamules instead of appressed, and central parts have branched isidioid lobules as in *P. hungaricum.* In addition, the ascospores in *P. hungaricum* are 1-septate.

Verrucaria bryoctona (Th. Fr.) Orange, Lichenologist 23: 3. 1991.

Thallus superficial, 0.9–1.4 cm in diam, yellow-green, granular-verrucose, composed of goniocyst-like units 15–40 µm in diam., without pigment in cell walls. Photobiont green, cells isodiametric to broadly rectangular, 5.5–10 × 4–7.5 µm. Perithecia spherical to broadly ovoid, 0.12–0.28 mm in diam., black, immersed in the substratum, ostiole pale grey, exciple pigmented throughout; involucrellum absent. Excipulum 20–40 µm thick, of textura angularis, darkly pigmented or slightly paler at base, ± reddish-brown, K+ dark grey-brown. Periphyses up to 25–35 × 2–2.5 µm, branched, sparingly anastomosing at base. Asci clavate, 60–75 × 12–17 µm, fissitunicate. Ascospores narrowly ellipsoid, 1(–3)-septate when mature, 19.5–26.5 × 5–7 µm, apices rounded or ± truncate with a small gelatinous appendage 2–3.5 µm wide and 1 µm long. Pycnidia absent.

Verrucaria bryoctona grows on slightly to strongly basic soil, usually with acrocarpous mosses, sometimes, overgrowing dead moss, in dry grassland. It occurs occasionally in semi-natural and man-made habitats such as dunes, waste ground, spoil heaps, and wall tops. New to Turkey and Asia, where it was accompanied by *Bilimbia sabuletorum, Cladonia pocillum,* and *Collema tenax.* Also known from Europe and North America (Orange 1991).

Specimen examined: **TURKEY**. **Burdur:** Bucak, surroundings of Karacaören dam, 37°21′35.14″N 30°50′05.80″E, 300 m, on soil and mosses, 25.06.2012, leg. K. Yazici. (KTUB– 2335).

Remarks— *Verrucaria bryoctona* is similar to *V. xyloxena,* which is distinguished by less elongated ascospores, the absence of a small gelatinous appendage, and a brown pigment in the thallus.

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